

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 3082 (2008): Assembly tools for screws and nuts -
Hexagon socket screw keys [PGD 5: Assembly Hand Tools]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



भारतीय मानक
पेंच और नटों के लिए संयोजन औज़ार —
षटकोणीय सॉकेट पेंच चाबी
(तीसरा पुनरीक्षण)

Indian Standard
ASSEMBLY TOOLS FOR SCREWS AND NUTS —
HEXAGON SOCKET SCREW KEYS
(*Third Revision*)

ICS 25.140.30

© BIS 2008

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

April 2008

Price Group 5

NATIONAL FOREWORD

This Indian Standard (Third Revision) which is identical with ISO 2936 : 2001 'Assembly tools for screws and nuts — Hexagon socket screw keys' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Assembly Hand Tools Sectional Committee and approval of the Medical Instruments, General and Production Engineering Division Council.

This standard was first published in 1965 and was first revised in 1973 in order to bring the specification in line with the manufacturing practices then followed. Keys having nominal sizes 1.5, 2 and 36 mm were included and key with nominal size 7 was deleted. The second revision was made in 1988 by deriving necessary assistance from ISO 2936 : 1983 'Assembly tools for screws and nuts — Hexagon socket screw keys — Metric series'. In the second revision, the hardness values, dimensions and torque values had been modified.

The ISO Standard has since been revised as ISO 2936 : 2001. To align this standard with international practices, the Sectional Committee, dealing with the subject, decided to revise the standard under dual numbering system. In this revision, three lengths and nominal sizes 0.7, 0.9 and 1.3 mm have been introduced. The requirement of hardness has also been modified.

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker in the International Standards, while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards, which are to be substituted in their respective places, are listed below along with their degree of equivalence for the editions indicated:

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
ISO 898-1 : 1999 Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs	IS 1367 (Part 3) : 2002 Technical supply conditions for threaded steel fasteners: Part 3 Mechanical properties of fasteners made of carbon steel and alloy steel — Bolts, screws and studs (<i>fourth revision</i>)	Identical
ISO 898-5 : 1998 Mechanical properties of fasteners made of carbon steel and alloy steel — Part 5: Set screws and similar threaded fasteners not under tensile stresses	IS 1367 (Part 5) : 2002 Technical supply conditions for threaded steel fasteners: Part 5 Mechanical properties of fasteners made of carbon steel and alloy steel — Set screws and similar threaded fasteners not under tensile stresses (<i>third revision</i>)	do
ISO 1703 : 1983 Assembly tools for screws and nuts — Nomenclature	IS 6293 : 1996 Assembly tools for screws and nuts — Nomenclature (<i>second revision</i>)	Technically Equivalent

(Continued on third cover)

Indian Standard

**ASSEMBLY TOOLS FOR SCREWS AND NUTS —
HEXAGON SOCKET SCREW KEYS**

(Third Revision)

1 Scope

This International Standard specifies the dimensions, method of test, designation and marking of hexagon socket screw keys. It also specifies the minimum values of Rockwell hardness that shall be met.

The specifications of this International Standard apply for tightening of hexagon socket screws for property class less than or equal to 12.9 as defined in ISO 898-1 and for tightening of socket set screws as defined in ISO 898-5.

NOTE Hexagon socket screw keys are listed under number 112 in ISO 1703:1983, *Assembly tools for screws and nuts — Nomenclature*.

2 Normative references

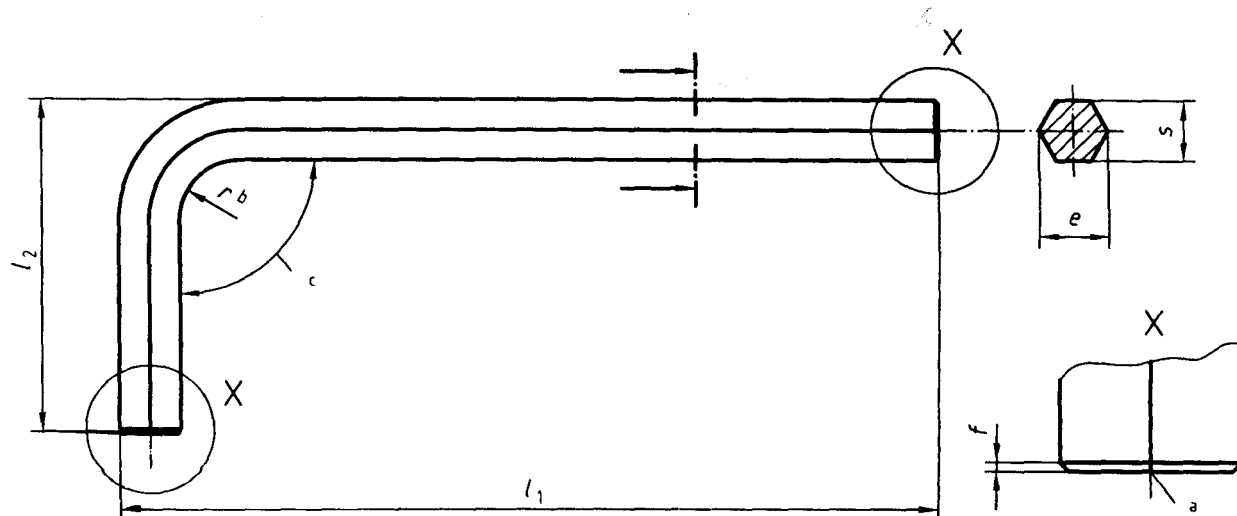
The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs*.

ISO 898-5, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 5: Set screws and similar threaded fasteners not under tensile stresses*.

3 Dimensions

See Figure 1 and Table 1.



a The corners may be sharp, rounded or chamfered and the radius of curvature or the chamfer f respectively shall not be greater than half the difference between width across corners e and width across flats s .

$$f_{\max} = \frac{e_{\max} - s_{\min}}{2}$$

Each end shall be square with the axis of each arm within $\pm 1^\circ$.

b r shall not be smaller than 1,5 mm, $r \geq s$

c $90^\circ +2^\circ_{-1^\circ}$ for width across flats ≤ 17 mm

$90^\circ +3^\circ_{-1^\circ}$ for width across flats > 17 mm

Figure 1 — Hexagon socket screw key

Table 1 — Dimensions

Dimensions in millimetres

Width across flats s			Width across corners e^a		l_1			Limit deviations	l_2	
nom.	max.	min.	max.	min.	Standard	Long	Extra-long			Limit deviations
0,7	0,71	0,70	0,79	0,76	33	—	—	$\begin{smallmatrix} 0 \\ -2 \end{smallmatrix}$	7	$\begin{smallmatrix} 0 \\ -2 \end{smallmatrix}$
0,9	0,89	0,88	0,99	0,96	33	—	—		11	
1,3	1,27	1,24	1,42	1,37	41	63,5	81		13	
1,5	1,50	1,48	1,68	1,63 ^b	46,5	63,5	91,5		15,5	
2	2,00	1,96	2,25	2,18 ^c	52	77	102		18	
2,5	2,50	2,46	2,82	2,75 ^c	58,5	87,5	114,5	$\begin{smallmatrix} 0 \\ -4 \end{smallmatrix}$	20,5	
3	3,00	2,96	3,39	3,31 ^c	66	93	129		23	
3,5	3,50	3,45	3,96	3,91	69,5	98,5	140		25,5	
4	4,00	3,95	4,53	4,44 ^c	74	104	144		29	
4,5	4,50	4,45	5,10	5,04	80	114,5	156		30,5	
5	5,00	4,95	5,67	5,58 ^d	85	120	165		33	
6	6,00	5,95	6,81	6,71 ^d	96	141	186		38	
7	7,00	6,94	7,94	7,85	102	147	197	$\begin{smallmatrix} 0 \\ -6 \end{smallmatrix}$	41	
8	8,00	7,94	9,09	8,97	108	158	208		44	
9	9,00	8,94	10,23	10,10	114	169	219		47	
10	10,00	9,94	11,37	11,23	122	180	234		50	
11	11,00	10,89	12,51	12,31	129	191	247		53	
12	12,00	11,89	13,65	13,44	137	202	262		57	
13	13,00	12,89	14,79	14,56	145	213	277	$\begin{smallmatrix} 0 \\ -7 \end{smallmatrix}$	63	$\begin{smallmatrix} 0 \\ -3 \end{smallmatrix}$
14	14,00	13,89	15,93	15,70	154	229	294		70	
15	15,00	14,89	17,07	16,83	161	240	307		73	
16	16,00	15,89	18,21	17,97	168	240	307		76	
17	17,00	16,89	19,35	19,09	177	262	337		80	
18	18,00	17,89	20,49	20,21	188	262	358		84	
19	19,00	18,87	21,63	21,32	199	—	—		89	
21	21,00	20,87	23,91	23,58	211	—	—	$\begin{smallmatrix} 0 \\ -12 \end{smallmatrix}$	96	$\begin{smallmatrix} 0 \\ -5 \end{smallmatrix}$
22	22,00	21,87	25,05	24,71	222	—	—		102	
23	23,00	22,87	26,16	25,86	233	—	—		108	
24	24,00	23,87	27,33	26,97	248	—	—		114	
27	27,00	26,87	30,75	30,36	277	—	—		127	
29	29,00	28,87	33,03	32,59	311	—	—		141	

Table 1 (continued)

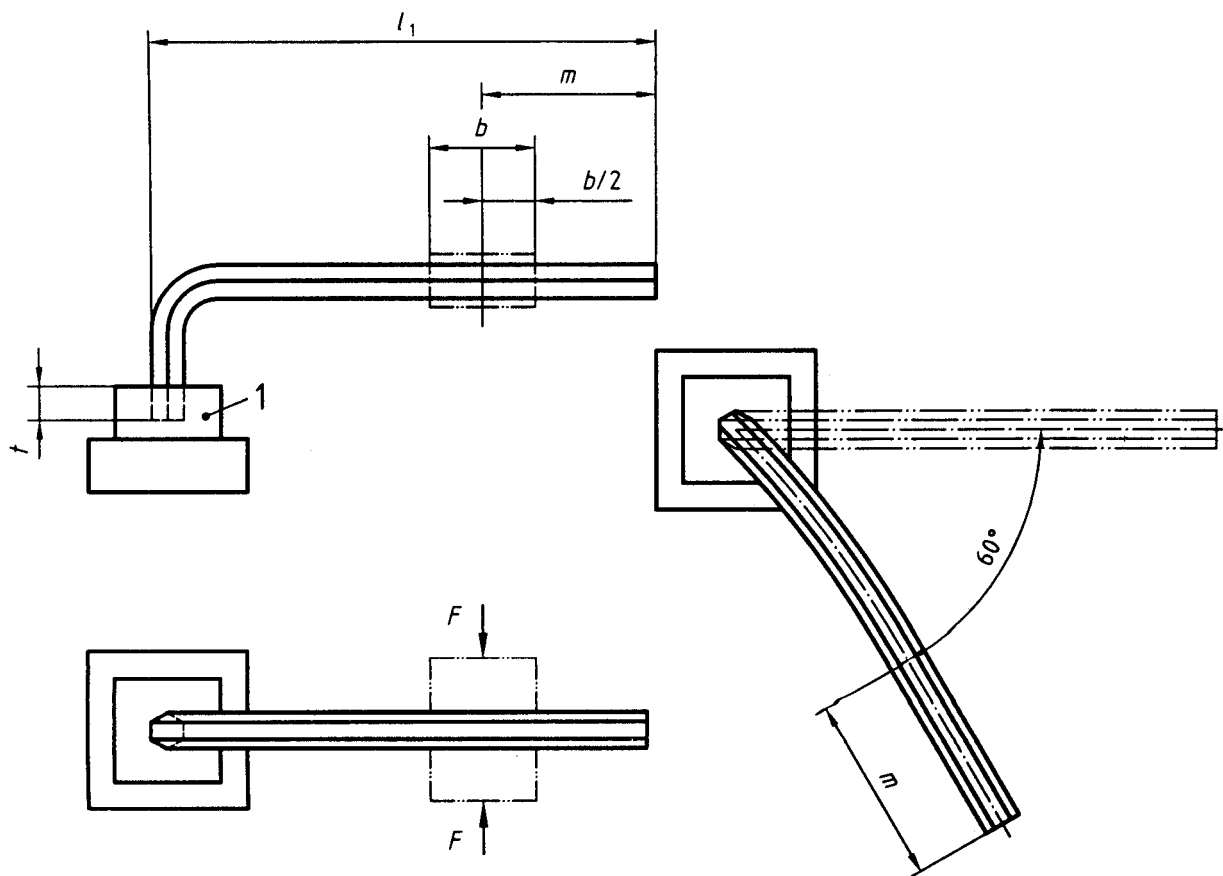
Width across flats			Width across corners							
s			e^a		l_1				l_2	
nom.	max.	min.	max.	min.	Standard	Long	Extra-long	Limit deviations		Limit deviations
30	30,00	29,87	34,17	33,75	315	—	—	$\begin{matrix} 0 \\ -12 \end{matrix}$	142	$\begin{matrix} 0 \\ -5 \end{matrix}$
32	32,00	31,84	36,45	35,98	347	—	—		157	
36	36,00	35,84	41,01	40,50	391	—	—		176	
<div>a $e_{\max} = 1,14 s_{\max} - 0,03$ (from $1,5 \leq s \leq 36$)</div> <div>$e_{\max} = 1,13 s_{\max}$ (from $8 \leq s \leq 36$)</div> <div>b $e_{\max} = 1,13 s_{\min} - 0,04$</div> <div>c $e_{\min} = 1,13 s_{\min} - 0,03$</div> <div>d $e_{\min} = 1,13 s_{\min} - 0,02$</div>										

4 Method of test

Insert the short arm of the key into a female hexagon socket adapter having a Rockwell hardness as given in Table 3. Smoothly apply an increasing load at a distance m from the end of the long arm of the key (where $m = l_1/3$, with a tolerance of ± 2 mm) until the proof torque is reached. It shall be ensured throughout the whole test procedure that the friction lock contact with the tool surface is maintained over the total area of the force-initiating contact area b as given in Table 2. The load shall be applied perpendicular to the axis of the key and the torque is calculated as the product of the applied load and the distance between the point of application of the load and the axis of the adapter. Test values are given in Table 3.

Following the application of the minimum test torque, any possible damage or deformation shall not affect the usability of the key.

For a key with a width across the flats of up to and including 14 mm the hexagon socket screw key shall show a total deformation, to torsion fracture, of at least 60° under load and a permanent deformation before failure.



Key
1 Female hexagon socket adapter

Figure 2 — Test configuration

Table 2 — Test dimensions for force-initiating contact area

Dimensions in millimetres

Width across flats s nom.	Force-initiating contact area b ± 1
$0,7 \leq s \leq 5$	10
$5 < s \leq 17$	20
$s > 17$	50

Table 3 — Test values

Width across flats of key <i>s</i>	Minimum Rockwell hardness of key ^a	Minimum proof torque ^b <i>M_d</i>	Width across flats of hexagon socket adapter ^c		Key engagement ^d	
			max.	min.	<i>t</i>	Limit deviations
			mm	mm		
mm	HRC	N·m			mm	mm
0,7	52	0,08	0,724	0,711	1,5	+1 0
0,9		0,18	0,902	0,889	1,7	
1,3		0,53	1,295	1,270	2	
1,5		0,82	1,545	1,520	2	
2		1,9	2,045	2,020	2,5	
2,5		3,8	2,560	2,520	3	
3		6,6	3,080	3,020	3,5	
3,5		10,3	3,595	3,520	4,5	
4		16	4,095	4,020	5	
4,5		22	4,595	4,520	5,5	
5		30	5,095	5,020	6	
6		52	6,095	6,020	8	
7		80	7,115	7,025	9	
8		120	8,115	8,025	10	
9	48	165	9,115	9,025	11	+2 0
10		220	10,115	10,025	12	
11		282	11,142	11,032	13	
12		370	12,142	12,032	15	
13		470	13,142	13,032	16	
14		590	14,142	14,032	17	
15	45	725	15,230	15,050	18	
16		880	16,230	16,050	19	
17		980	17,230	17,050	20	
18		1 158	18,230	18,050	21,5	
19		1 360	19,275	19,065	23	
21		1 840	21,275	21,065	25	
22		2 110	22,275	22,065	26	
23		2 414	23,275	23,065	27,5	
24		2 750	24,275	24,065	29	
27		3 910	27,275	27,065	32	
29		4 000	29,275	29,065	35	

Table 3 (continued)

Width across flats of key s mm	Minimum Rockwell hardness of key ^a HRC	Minimum proof torque ^b M_d N·m	Width across flats of hexagon socket adapter ^c		Key engagement ^d	
			max. mm	min. mm	t mm	Limit deviations mm
30	45	4 000	30,330	30,080	36	+2 0
32		4 000	32,330	32,080	38	
36		4 000	36,330	36,080	43	

^a The hexagon socket screw keys shall be hardened to a through hardness over their whole length.
^b $M_d = 0,85 (0,7 R_m) (0,224 5 s^3)$ where R_m is the tensile strength. This formula does not apply to keys of widths across flats s from $29 \text{ mm} \leq s \leq 36 \text{ mm}$.
^c Hardness of the test hexagon socket adapter:
 $s \leq 17$: 60 HRC min.
 $s > 17$: 55 HRC min.
Width across corners of hexagon socket adapter: $e_{\min.} = e_{\max.} (\text{Table 1}) + 0,05$
^d $t \approx 1,2 s$ ($t \approx 1,5 s$ for sizes smaller than 1,5 mm). These values apply to the test only. In practice, key engagement is less.

5 Designation

A socket screw key conforming to this International Standard shall be designated by:

- "Socket screw key";
- reference to this International Standard, i.e. ISO 2936;
- its width across the flats, s , in millimetres;
- capital letter M in the case of the design with a long length.
- capital letter L in the case of the design with an extra-long length.

EXAMPLE 1 A hexagon socket screw key with a width across flats $s = 10 \text{ mm}$ is designated as follows:

Socket screw key ISO 2936 - 10

EXAMPLE 2 A hexagon socket screw key, with a width across flats $s = 10 \text{ mm}$ and long length (M) is designated as follows:

Socket screw key ISO 2936 - 10 M

EXAMPLE 3 A hexagon socket screw key, with a width across flats $s = 10 \text{ mm}$ and extra-long length (L) is designated as follows:

Socket screw key ISO 2936 - 10 L

6 Marking

Hexagon socket screw keys of 3 mm size and above shall be marked, legibly and permanently with at least:

- a) the name or trademark of the manufacturer (or supplier);
- b) the width across flats.

If not worked on the tool itself, this information shall be given at least on the smallest commonly used packaging unit.

NATIONAL ANNEX A
(National Foreword)

A-1 PACKING

A-1.1 Each key or a number of keys may be wrapped in non-absorbent paper and packed in a carton or commonly used packaging unit. The keys of different sizes may be packed to form a set. The sizes and the number of keys to comprise such a set shall depend on the job for which it is required and shall be subject to prior agreement between the manufacturer and the purchaser. The carton or commonly used packaging unit shall also be marked with information required under 6.

A-2 BIS CERTIFICATION MARKING

A-2.1 The keys may also be marked with the Standard Mark.

A-2.1.1 The use of the Standard Mark is governed by the provision of *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made there under. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

(Continued from second cover)

A separate clause has been added on packing and the same is given at National Annex A to this standard. Further, for designation of keys, wherever 'ISO 2936' appear referring to this standard, they should be read as 'IS 3082'.

The keys may also be marked with the Standard Mark. The details are given at National Annex A to this standard.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc: No. PGD/MGD 05 (0540).

Amendments Issued Since Publication

Amendment No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002
Telephones: 2323 0131, 2323 3375, 2323 9402 Website: www.bis.org.in

Regional Offices:

	Telephones
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110 002	{ 2323 7617 2323 3841
Eastern : 1/14, C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi KOLKATA 700 054	{ 2337 8499, 2337 8561 2337 8626, 2337 9120
Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160 022	{ 260 3843 260 9285
Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600 113	{ 2254 1216, 2254 1442 2254 2519, 2254 2315
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400 093	{ 2832 9295, 2832 7858 2832 7891, 2832 7892

Branches: AHMEDABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAJKOT. THIRUVANANTHAPURAM. VISAKHAPATNAM.